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COLONIZATION OF JAPANESE BEETLE PARASITES IN THE EASTERN STATES IN 1938

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In 1937 a summary report entitled, "Liberations of Japanese Beetle Parasites in the Eastern States in 1937," was published in the Insect Pest Survey Bulletin (Vol. 17, Supp. to No. 9, pp. 473-482). In that report the early colonization of the more important established parasites, from the first colonization to the close of 1937, was given in tabular form. The purpose of the present report is to continue the colonization record of the established parasites to date and to give additional notes on species receiving little or no attention in the former report.

There are at present considered as established three dipterous species and two species and two racial forms of hymenopterous parasites. The status of the species and strains is as follows:

Dexia ventralis Ald.--Since the initial colonization of this parasite in 1926, through the year 1938, a total of 15,254 individual parasites have been released in varying numbers in 14 colonies, distributed in 5 States as follows: New Jersey, 3; Pennsylvania, 5; Illinois, 4; Maryland, 1; and Long Island, N. Y., 1. All of the colonies liberated prior to 1938 have been scouted for recovery from time to time, but only 1, at Haddonfield, N. J., has been recovered. This colony has served as a source of material for several years. One colony was released in Chester County, Pa., in 1938. This parasite has 3 broods annually, but it is hindered in its development and increase because of the scarcity of Japanese beetle host larvae during the flight period of the second brood of Dexia females. The general scarcity of native scarabaeid larvae, which might serve as alternate hosts during this period, also is a factor affecting the build-up of this parasite in the area where it is now established. The only way of augmenting the use of this parasite would seem to be placing it in new areas where Popillia occur in conjunction with Phyllophaga, the latter serving as an alternate host during the time the second brood of Dexia females are larvipositing. In its natural spread to the southward the Japanese beetle seems to be entering an area where several species of Phyllophaga are more abundant, thus in view of a possibility of finding new and satisfactory areas for future liberations of Dexia ventralis, a nucleus of reared material is now being held for future experimental colonization of this species. At present D. ventralis is of little economic importance.

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Prosenia siberita F.--This parasite of Japanese beetle larvae has been released in numbers totaling 12,364 individuals, distributed in varying numbers in 5 colonies between 1923 and 1930. Only 1 colony in the Moorestown, N. J., area is known to be established. No recent colonization of this species has been undertaken. The species does not increase in sufficient numbers to be of economic importance. The inability of Prosenia to increase its numbers is due largely to the fact that its adult stage is numerous during the flight period of its host, consequently the scarcity of beetle larvae at this time is unfavorable. In Japan this parasite is most numerous in areas where Popillia has a partial 2-year life cycle, but so far within the area now occupied by the beetle in the United States, the occurrence of a 2-year cycle is rare and so localized as to be of little benefit in increasing the numbers of this parasite.

Centeter cinerea Ald.--This Japanese fly is a parasite of the adult stage of the Japanese beetle. It has been extensively introduced and from 1922 through 1938 more than 70,000 flies have been liberated in varying numbers in 23 colonies, 13 of which have been recorded as established. One colony was liberated in 1938 in Washington, D. C. Surveys in 1936 indicate that the species has spread over 500 square miles in New Jersey and Pennsylvania. The species is not synchronized with the bulk of its host, generally appearing about 2 weeks too early. Releasements at Keene, N. H., in 1936 were tests to determine whether in more northern areas proper synchronization would take place; however, limited observations at Keene in 1938 seem to indicate that there also the species is too early to meet the greatest number of beetles. Studies are now being started on this species in southern areas.

Table 1.--Colony distribution of Centeter cinerea

State	: Colonies : liberated : in 1922-38	: Colonies : recovered : in 1938
	: Number	: Number
Connecticut	3	2
New Jersey	5	4
Pennsylvania	13	7
New Hampshire	1	1
Washington, D. C.	1	0
Total	23	14

Tiphia vernalis Roh.--This is the most important parasite of the Japanese beetle. The species has been extensively colonized, the present total colonies numbering 1,127, of which 316 were placed in the field in the spring of 1938. All material now used for colonization purposes is field-collected from older colonies. Parasitization of Japanese beetle grubs by this species ranges from 10 to 60 percent, varying according to locality and abundance of host. In 1938 there were 300 colonies released in Maryland, distributed as follows: Cecil County, 179; Kent County, 40; Harford County, 39; Baltimore County, 38; Wicomico County, 2; Somerset County, 1; Worcester County, 1. This number was large enough to permit close placement of the colonies throughout the zone of intense beetle infestation, and also to colonize other areas sufficiently infested so as to reasonably assure establishment of the parasite. In addition, 15 colonies were released in Connecticut, in the following counties: Fairfield, 9; New Haven, 1; New London, 1; Windham, 1; and Hartford, 3. One large colony of 635 females was liberated at a very favorable spot

in Chester County, Pa. The present distribution of this parasite according to States is shown in table 2, and the accompanying map presents its distribution graphically.

Table 2.--Present distribution of *Tiphia vernalis*

State	Releases		Total colonies	
	Prior to 1938	In 1938	Released	Recovered
	Number	Number	Number	Number
Connecticut	9	15	24	4
Delaware	42	0	42	5
District of Columbia	1	0	1	0
Maryland	35	300	335	2
Massachusetts	3	0	3	1
New Hampshire	3	0	3	1
New Jersey	289	0	289	75
New York	12	0	12	1
Pennsylvania	416	1	417	139
Rhode Island	1	0	1	0
Total	811	316	1,127	228

Tiphia popilliavora Roh.—The total number of colonies of this species is 676, of which 94 were liberated in 1938. All material now used in the colonization of this species is derived from older colonies. For the past few years this parasite has shown a decline in abundance within the older area of beetle infestation, which also has been marked by a reduction in beetle population. A slight increase in parasite abundance was noted in 1938; however, it is doubtful whether this will be evident in 1939, because of the generally poor condition of host larvae during the egg-laying period in 1938. Host grubs at this time were late in development and consisted of a predominance of second-instar larvae, which, if accepted by the parasite, will result in a high rate of mortality and a predominance of male *Tiphia* in 1939. The 94 liberations made in 1938 were distributed as follows: 64 colonies in Maryland, of which 34 were in Cecil County, 24 in Harford County, 2 in Kent County, and 1 each in Dorchester, Somerset, Washington, and Worcester Counties; 18 colonies in Connecticut, of which 11 were in Fairfield County, 2 in Hartford County, 3 in New Haven County, 1 in New London County, and 1 in Windham County; and in New York State, 12 colonies were liberated in Westchester County. Table 3 gives the present total distribution of the species according to States, and the map shows graphically the general distribution in States where large releaselements have been made.

Table 3.--Present distribution of *Tiphia popilliavora*

State	Releases		Total colonies	
	Prior to	In 1938	Released	Recovered
	1938			
	Number	Number	Number	Number
Connecticut	6	18	24	5
Delaware	31	0	31	2
Maryland	11	64	75	0
New Jersey	223	0	223	56
New York	3	12	15	0
Pennsylvania	308	0	308	191
Total	582	94	676	254

Tiphia popilliavora Roh. (Korean strain).---This racial form of the Japanese type is from Chosen (Korea). It has been more recently introduced and has been colonized in 37 different locations in 4 States, as follows: Delaware, 3; Maryland, 1; New Jersey, 13; and Pennsylvania, 20. Seven of the Pennsylvania colonies were placed in Chester County during the season of 1938. Limited scouting for recovery was conducted in 1938 and at present 6 colonies out of the 37 have been recovered.

Tiphia popilliavora Roh. (Chinese strain).---This is another late-season form of the type occurring in China. It was introduced with the hope of obtaining better synchronization of parasite and host. Between 1927 and 1929, 22 colonies, comprising 4,130 individuals, were released. One feebly established colony was recovered in 1929 and again in 1930. Its status will again be checked in 1939.







